

Claims:

1. A photocurable dental restorative comprising (i) 100 parts by weight of a polymerizable monomer, (ii) 0.01 to 5 parts by weight of a photopolymerization initiator of acylphosphine oxide, and (iii) 200 to 1900 parts by weight of an inorganic filler, wherein the inorganic filler (iii) is a mixed filler of:

(A) irregular-shaped inorganic particles having an average particle size of not smaller than 0.1  $\mu\text{m}$  but smaller than 1  $\mu\text{m}$ ;

(B) spherical inorganic particles having an average primary particle size of not smaller than 0.1  $\mu\text{m}$  but not larger than 5  $\mu\text{m}$ ; and

(C) fine inorganic particles having an average primary particle size of not larger than 0.1  $\mu\text{m}$ ;

which are so blended as to satisfy the following mass ratios ① to ③:

①  $\text{mA}/(\text{mB} + \text{mC}) = 0.2$  to 3

②  $\text{mB}/(\text{mB} + \text{mC}) = 0.5$  to 0.99

③  $\text{mC}/(\text{mB} + \text{mC}) = 0.01$  to 0.5

where  $\text{mA}$ ,  $\text{mB}$  and  $\text{mC}$  are masses of the inorganic particles (A) to (C).

2. A photocurable dental restorative according to claim 1, wherein said mixed filler (iii) is obtained by so blending the inorganic particles (A) to (C) as to satisfy the following mass ratios ①' to ③':

①'  $\text{mA}/(\text{mB} + \text{mC}) = 0.4$  to 2.3

②'  $\text{mB}/(\text{mB} + \text{mC}) = 0.6$  to 0.9

③'  $\text{mC}/(\text{mB} + \text{mC}) = 0.1$  to 0.4.

3. A photocurable dental restorative according to claim 1, wherein in said mixed filler (iii), a maximum size of aggregates of primary particles of the spherical inorganic particles (B) and a maximum size of aggregates of primary particles of the fine inorganic particles (C)

See also  
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are not larger than 20  $\mu\text{m}$ , respectively, and a total amount of the aggregates thereof is not larger than 20% by volume of the whole mixed filler (iii).

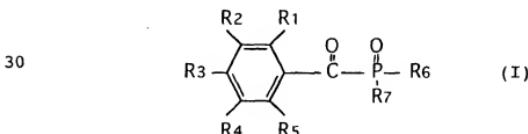
4. A photocurable dental restorative according to 5 claim 1, wherein said spherical inorganic particles (B) have an average primary particle size of not larger than 1  $\mu\text{m}$ .

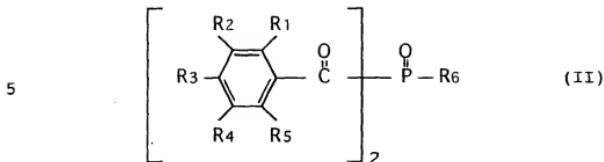
5. A photocurable dental restorative according to 10 claim 1, wherein said fine inorganic particles (C) have an average primary particle size of from 0.05 to 0.09  $\mu\text{m}$ .

6. A photocurable dental restorative according to claim 1, wherein said mixed filler (iii) has a volume of the pores of not smaller than 0.08  $\mu\text{m}$  due to strongly aggregated particles of not larger than 0.1 cc/g.

15 7. A photocurable dental restorative according to claim 1, wherein said mixed filler (iii) has at least one distribution peak at a position of a particle size of not larger than 0.1  $\mu\text{m}$  and at a position of a particle size of not smaller than 0.1  $\mu\text{m}$  but not larger than 1  $\mu\text{m}$ , 20 respectively, on particle size distribution based on the volume of particles, but has no distribution peak at a position of a particle size in excess of 5  $\mu\text{m}$ .

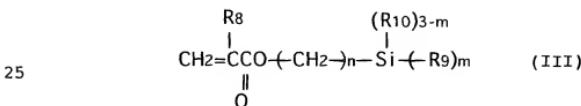
25 8. A photocurable dental restorative according to claim 1, wherein said acylphosphine oxide is represented by the following general formula (I) or (II):



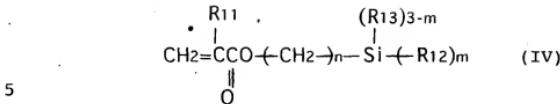


10 wherein each of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is any one of the groups selected from the group consisting of a hydrogen atom, a halogen atom, an alkyl group, an alkoxy group, an alkylthio group, and a substituted or unsubstituted aryl group, and each of  $R_6$  and  $R_7$  is any one of the groups selected from the group  
15 consisting of a substituted or unsubstituted alkyl group, a substituted or unsubstituted alkenyl group, and a substituted or unsubstituted aryl group.

9. A photocurable dental restorative according to  
claim 1, wherein said irregular-shaped inorganic particles  
20 (A) are treated for their surfaces with a silane coupling  
agent represented by the following general formula (III),



wherein  $R_8$  is a hydrogen atom or a methyl group,  $R_9$  is an alkoxy group, a chlorine atom or an isocyanate group,  $R_{10}$  is an alkyl group having 1 to 6 carbon atoms,  $m$  is an integer of 2 to 3, and  $n$  is an integer of 8 to 20,  
30 and said fine inorganic particles (C) are treated for their surfaces with a silane coupling agent represented by  
35 the following general formula (IV).



wherein  $\text{R}_{11}$  is a hydrogen atom or a methyl group,  $\text{R}_{12}$  is an alkoxy group, a chlorine atom or an isocyanate group,  $\text{R}_{13}$  is an alkyl group having 1 to 6 carbon atoms,  $m$  is an integer of 2 to 3, and  $n$  is an integer of 2 to 3.

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10. A photocurable dental restorative according to claim 1, wherein an amine compound is contained in an amount of from 0.01 to 5 parts by weight per 100 parts by weight of the polymerizable monomer (i).

11. A method of producing a photocurable dental restorative by preparing an inorganic filler by mixing:

(A) irregular-shaped inorganic particles having an average particle size of not smaller than  $0.1 \mu\text{m}$  but 20 smaller than  $1 \mu\text{m}$ ;

(B) spherical inorganic particles having an average primary particle size of not smaller than  $0.1 \mu\text{m}$  but not larger than  $5 \mu\text{m}$ ; and

(C) fine inorganic particles having an average primary 25 particle size of not larger than  $0.1 \mu\text{m}$ ;

so as to satisfy the following mass ratios ① to ③:

- ①  $\text{mA}/(\text{mB} + \text{mC}) = 0.2$  to 3
- ②  $\text{mB}/(\text{mB} + \text{mC}) = 0.5$  to 0.99
- ③  $\text{mC}/(\text{mB} + \text{mC}) = 0.01$  to 0.5

30 where  $\text{mA}$ ,  $\text{mB}$  and  $\text{mC}$  are masses of the inorganic particles (A) to (C), and by mixing 100 parts by weight of a polymerizable monomer, 0.01 to 5 parts by weight of a photopolymerization initiator of acylphosphine oxide, and 35 200 to 1900 parts by weight of said inorganic filler.